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ART UNIT	**PAPER NUMBER**
1634	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/553,747	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	Narayan K. Bhat	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) *8-16 and 18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 17 and 19-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is written in reply to applicant's correspondence filed September 12, 2007. Claims 1, 2, 4 and 17 were amended and new claims 19-26 were added. Applicant's amendment requiring a plastic substrate necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**.

2. Claims 1-26 are pending in this application, claims 8-16 and 18 were withdrawn.

3. Claims 1-7, 17 and 19-26 are under prosecution.

Amendments to Claims

4. Amendments to the claims 1, 2, 4 and 17 have been reviewed and entered.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4-5, 17, 19, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Henderson et al (USPGPUB NO. US2003/0013111 published Jan. 16, 2003, herein after Henderson).

Regarding claim 1, Henderson teaches a molecular detection method, which include depositing sample on the surface (Fig. 2, # 22) and further teaches that surface

include polystyrene, polypropylene, i.e., plastic (paragraph 0073) and sample contains DNA or RNA or protein (paragraph 0058). Henderson also teaches scanning the surface with a Atomic Force Microscope (AFM) in solution, i.e., scanning probe microscope in solution (Fig. 2, # 30, paragraphs 0102-0114) for visualizing and identifying a chain molecule (Fig. 2, # 32, Fig. 11, paragraph 0107). The DNA or the RNA or the protein molecules of Henderson are the chain molecules of the instant claim.

Regarding claims 4 and 5, Henderson teaches an embodiment wherein antibodies, i.e., proteins on the surface of the array binds to virus in the sample (paragraph 0072) resulting in dimensional changes (paragraphs 0102-0104) and detecting the changes in the height at the array position as a result of molecular interaction (Fig. 11, paragraphs 0105-0107). The antibody molecule is the chain molecule immobilized on the plastic substrate of claim 4 and a protein molecule of the multiple strand complex of claim 5. Henderson also teaches the height of the array sample increases after interaction with target sample vertically (Fig. 11, paragraph 0107), thus teaching multiple strand chain molecule is an uprightly disposed single strand molecule.

Regarding claim 17, Henderson teaches method of creating and utilizing an array that includes providing a surface (Fig. 2, # 18, paragraphs 0070-0073) and depositing the sample (Fig. 2, # 22, paragraphs 0044-0045, 0090-0096), exposing the array to medium containing sample (Fig. 2, # 28, paragraphs 0046 and 0102-0104), scanning the array with scanning probe microscope (Fig. 2, # 30, paragraphs 0046 and 0105-

0107) and analyzing data (Fig. 2, # 32, paragraphs 0046 and 0107), thus teaching a production process for a substrate with a chain molecule immobilized thereon, the production process including the method according to Claim 1.

Regarding claim 19, Henderson teaches a molecular detection method, which include depositing sample on the surface (Fig. 2, # 22) and further teaches that sample contains DNA or RNA (paragraph 0058). Henderson also teaches scanning the surface with a Atomic Force Microscope (AFM) in solution, i.e., scanning probe microscope in solution (Fig. 2, # 30, paragraphs 0102-0114) for visualizing and identifying a chain molecule (Fig. 2, # 32, Fig. 11, paragraph 0107). The DNA or the RNA molecule of Henderson is the chain molecule of said claim.

Regarding claim 25, Henderson teaches a method of creating and utilizing an array that includes providing a surface (Fig. 2, # 18, paragraphs 0070-0073) and depositing the sample comprising nucleic acids (Fig. 2, # 22, paragraphs 0044-0045, 0058, 0090-0096), exposing the array to medium containing sample (Fig. 2, # 28, paragraphs 0046 and 0102-0104), scanning the array with scanning probe microscope (Fig. 2, # 30, paragraphs 0046 and 0105-0107) and analyzing data (Fig. 2, # 32, paragraphs 0046 and 0107), thus teaching a production process for a substrate with a chain molecule immobilized thereon, the production process including the method according to Claim 19.

Regarding claim 26, Henderson teaches a molecular detection method, wherein substrate is a polystyrene or polypropylene substrate, i.e., plastic substrate (paragraph 0073).

7. Claims 19-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Liu et al (Nano Letters, 2002, 2, 863-867, herein after Liu).

Regarding claim 19, Liu teaches a molecular detection method, which include adsorbing single stranded DNA on the surface, i.e., immobilizing a nucleic acid on the surface (Fig. 2C, pg. 864, column1, paragraph 4) and further teaches scanning the surface with a Atomic Force Microscope (AFM) in solution, i.e., scanning probe microscope in solution (Figs. 3A and B, 4 A , B and C, pgs. 864 and 865, column 2 and 1, paragraphs 1 and 1-2) for visualizing and identifying a chain molecule (Fig. 2, # 32, Fig. 11, paragraph 0107). The single stranded DNA molecule of Liu is the chain molecule of said claim.

Regarding claim 20, Liu teaches a molecular detection method, wherein the nucleic acid is uprightly disposed on the substrate (Figs. 1 and 3A, pgs. 864 and 865, column 2 and 1, paragraphs 1 and 1, Abstract).

Regarding claim 21, Liu teaches an embodiment, wherein the single stranded DNA, i.e., chain molecule immobilized on the substrate, interacts with an enzyme DNaseI (Fig. 4, compare image pattern in panel A and B). The DNAseI molecule interacting with DNA is interpreted as forming multi-strand molecule with the chain molecule immobilized on the substrate. Thus teachings of Liu meet the limitation of a multiple strand molecule comprising the nucleic acid and at least one chain molecule that can bind to the nucleic acid.

Regarding claim 22, Liu teaches that the multiple strand molecules are complex of nucleic acid and DNaseI, i.e., protein molecule (pg. 866, column 1, paragraph 1).

Regarding claims 23 and 24, Liu teaches a molecular counting method comprising scanning three different area of the substrate and detecting a molecule by Atomic Force Microscope, and counting the number of detected chain molecules per unit area and giving the molecular localization information (Fig. 3 E and F, pg. 865, column 1, paragraph 2).

Regarding claim 25, Liu teaches a method of immobilizing single stranded nucleic acid on the substrate (Fig. 2C, pg. 864, column1, paragraph 4) and depositing the sample comprising nucleic acids (Fig. 2, # 22, paragraphs 0044-0045, 0058, 0090-0096), and further teaches scanning the surface with a Atomic Force Microscope (AFM) in solution, i.e., scanning probe microscope in solution (Figs. 3A and B, 4 A , B and C, pgs. 864 and 865, column 2 and 1, paragraphs 1 and 1-2) for visualizing and identifying a chain molecule (Fig. 2, # 32, Fig. 11, paragraph 0107), thus teaching a production process for a substrate with a chain molecule immobilized thereon, the production process including the method according to Claim 19.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-3, 6-7 and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henderson et al (USPGPUB NO. US2003/0013111 published Jan. 16, 2003, herein after Henderson) in view of Liu et al (Nano Letters, 2002, 2, 863-867, herein after Liu).

Teachings of Henderson regarding claims 1 and 19 and their dependent claims are described in this office action

Regarding claims 2-3 and 20, Henderson teaches a molecular detection method, wherein the DNA or RNA or protein molecules, i.e., chain molecule immobilized on the plastic substrate (paragraphs 0072-0073) and further teaches single strand molecule is a nucleic acid or a protein molecule (paragraph 0058).

Regarding claims 21 and 22, Henderson teaches nucleic molecules are immobilized on the substrate (paragraph 0058) to detect substance in the target sample that includes nucleic acid (paragraphs 0046, 0058 and 0061).

Regarding claims 6-7 and 23-24, teaches scanning the immobilized chain molecules, analyzing the results for height and specific molecular interactions for molecular localization (Figs. 2, paragraphs 0107-0110) but silent about counting the

number of detected chain molecules per unit area. Henderson does not teach immobilized chain molecules are uprightly disposed single strand molecule. However, orientation of immobilized chain molecules on the substrate and number of molecules per unit area were known in the art at the time of claimed invention was made as taught by Liu.

Regarding claims 2 and 20, Liu teaches a molecular detection method, wherein the nucleic acid is uprightly disposed on the substrate (Figs. 1 and 3A, pgs. 864 and 865, column 2 and 1, paragraphs 1 and 1, Abstract).

Regarding claims 6-7 and 23-24, Liu teaches a molecular counting method comprising scanning three different area of the substrate and detecting a molecule by Atomic Force Microscope, and counting the number of detected chain molecules per unit area and giving the molecular localization information (Fig. 3 E and F, pg. 865, column 1, paragraph 2).

Liu also teaches DNA nanopatterning methodology provides a unique opportunity for engineering biostructures with nanometer precision that benefits the nanofabrication of DNA biosensors and biochips (pg. 866, column 2, paragraph 1).

It would have been prima facia obvious to one having the ordinary skill in the art at the time the invention was made to include the quantification of immobilized molecules on the surface method of Liu in the molecular detection method of Henderson with a reasonable expectation of success.

An artisan would have been motivated to include the quantification of immobilized molecules on the surface method of Liu in the molecular detection method

of Henderson with the expected benefit of utilizing DNA nanopatterning methodology, which provides a unique opportunity for engineering biostructures with nanometer precision that benefits the nanofabrication of DNA biosensors and biochips as taught by Liu (pg. 866, column 2, paragraph 1).

Response to Remarks from the applicants

Claim Objections

11. Claim objections in the previous office action are withdrawn in view of applicant's amendments and/or correction of the claims.

Claim withdrawal consideration

12. Applicants request to reconsider withdrawn claim18 (Remarks, pg. 9, paragraph 3) was not considered because claim 18 though recite process step, but depends from withdrawn non elected molecular detection invention system.

Claim Rejections Under 35 U.S.C. § 102(b)

13. All rejections set forth under the § *35 U.S.C. § 102(b)* in the previous office action are withdrawn in view of applicant's amendments and/or cancellation of the claims.

Conclusions

14. No claims are allowed.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Narayan K. Bhat whose telephone number is (571)-272-5540. The examiner can normally be reached on 8.30 am to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram R. Shukla can be reached on (571)-272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Narayan K. Bhat, Ph. D.

Examiner

Art Unit 1634

BJ FORMAN, PH.D.
PRIMARY EXAMINER